

Serial No. 09/648,523
August 5, 2002
Page 4

REMARKS

Claims 1-16 are pending in this application. By this amendment, Applicant amends claims 1, 5 and 7.

Claims 1, 2, 5-10, 12, 13, 15 and 16 were rejected under 35 U.S.C. § 102(a) as being anticipated by Kaida (U.S. 6,040,562), Kaida (U.S. 6,232,698), Ogawa (U.S. 4,894,580) or Kittaka (U.S. 4,939,403). And claims 3, 4, 11 and 14 were rejected under 35 U.S.C. § 102(a) as being anticipated by Kittaka. Applicant respectfully traverses these rejections.

Claim 1 has been amended to recite:

"An energy-trap thickness extensional vibration mode piezoelectric resonator, comprising:

a piezoelectric body including a plurality of piezoelectric layers and uniformly polarized in a thickness direction thereof; and

N number of internal electrodes, where N equals 3, 4 or 5, arranged in the piezoelectric body on top of each other with the piezoelectric layers disposed therebetween; wherein

the piezoelectric body vibrates in an (N-1)th higher-order mode of a thickness extensional vibration mode generated by applying electric fields of opposite polarity alternately in the direction of thickness to piezoelectric layers between internal electrodes, and when the thickness of a piezoelectric layer between adjacent internal electrodes in the direction of thickness is denoted by D and the thicknesses of a first and second piezoelectric layer outside the outermost internal electrodes in the direction of thickness are denoted by D₁ and D₂, the following relationships are satisfied: 0.50 ≤ (D₁ + D₂)/2D < 1.00 at N = 3, 0.50 ≤ (D₁ + D₂)/2D ≤ 0.90 at N = 4, and 0.50 ≤ (D₁ + D₂)/2D ≤ 0.80 at N = 5." (Emphasis added)

Claims 3, 5 and 7 recite features that are similar to claim 1, including the emphasized features.

The Examiner alleged that Kaida '652, Kaida '698, Ogawa and Kittaka all teach piezoelectric resonators having three internal electrodes arranged such that D₁ + D₂/2D = 1, where D₁ and D₂ denote the thicknesses of a first and second piezoelectric layer outside the outermost internal electrodes in the direction of thickness, and D denotes the thickness of a piezoelectric layer between adjacent internal electrodes in the direction of thickness.

Serial No. 09/648,523
August 5, 2002
Page 5

Additionally, the Examiner alleged that although "it is true that the references don't explicitly define the piezoelectric layer thickness and drawings are not expected to be an exact depiction of dimensions. . . . It is also clear that the references give no reason why the layers should or would be of different thicknesses. Thus, it is fair and reasonable to assume the layer thickness is meant to be uniform (within manufacturing tolerances) and $D_1=D_2$ " (emphasis added).

According to the Examiner's interpretation of the prior art references, at best, these prior art references teach that all of the layers are the same thickness such that $D_1=D_2$ and $(D_1 + D_2)/2D \approx 1.00$. As acknowledged by the Examiner, "the references give no reason why the layers should or would be of different thicknesses". Thus, Applicant respectfully submits that the prior art references clearly fail to teach or suggest relationships: " $0.50 \leq (D_1 + D_2)/2D < 1.00$ at $N = 3$, $0.50 \leq (D_1 + D_2)/2D \leq 0.90$ at $N = 4$, and $0.50 \leq (D_1 + D_2)/2D \leq 0.80$ at $N = 5$ " as recited in claim 1, " $0.10 \leq (D_1 + D_2)/2D \leq 0.80$ at $N = 3$, $0.10 \leq (D_1 + D_2)/2D \leq 0.50$ at $N = 4$, and $0.10 \leq (D_1 + D_2)/2D \leq 0.45$ at $N = 5$ " as recited in claim 3, " $0.60 \leq (D_1 + D_2)/2D < 1.00$ or $1.00 < (D_1 + D_2)/2D \leq 1.10$ at $N = 3$, $0.65 \leq (D_1 + D_2)/2D \leq 0.90$ at $N = 4$, and $0.60 \leq (D_1 + D_2)/2D \leq 0.80$ at $N = 5$ " as recited in claim 5, or " $0.10 \leq (D_1 + D_2)/2D < 1.00$ or $1.00 < (D_1 + D_2)/2D \leq 1.10$ at $N = 3$, $0.10 \leq (D_1 + D_2)/2D \leq 0.90$ at $N = 4$, and $0.10 \leq (D_1 + D_2)/2D \leq 0.80$ at $N = 5$ " as recited in claim 7.

Accordingly, Applicant respectfully submits that Kaida ('652), Kaida ('698), Ogawa and Kittaka, taken individually or in combination, fail to teach or suggest the unique combination and arrangement of elements recited in claims 1, 3, 5 and 7 of the present application.

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1, 3, 5 and 7 are allowable. Claims 2, 4, 6 and 8-16 depend upon claims 1, 3, 5 and 7, and are therefore allowable for at least the reasons that claims 1, 3, 5 and 7 are allowable.

In view of the foregoing Remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance

Serial No. 09/648,523
August 5, 2002
Page 6

are respectfully solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

Date: August 5, 2002

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